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REMARKS

Claims 1-30 are pending in the present application. In the Office Action mailed July 13, 2005, the Examiner rejected claims 1, 5-9, 12, and 15 under 35 U.S.C. §102(b) as being anticipated by Moore (USP 4,181,858). The Examiner next rejected claims 2 and 3 under 35 U.S.C. §103(a) as being unpatentable over Moore as applied to claim 1 above, and further in view of Toth (USP 5,457,724). Claim 4 is rejected under 35 U.S.C. §103(a) as being unpatentable over Moore as applied to claim 1 above, and in further view of Katsumata et al. (USP 4,558,458). Claim 10 is rejected under 35 U.S.C. §103(a) as being unpatentable over Moore as applied to claim 1 above, and further in view of Hsieh (USP 5,696,807). Claim 11 is rejected under 35 U.S.C. §103(a) as being unpatentable over Moore as applied to claim 1 above, and further in view of Lienard et al. (US Pub. 2003/0007603). Claims 13 and 14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Moore as applied to claim 1 above, and further in view of Saunders (USP 4,896,343). Claims 16 and 22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Toth in view of Horiuchi (US Pub. 2002/0037067). Claim 17 is rejected under 35 U.S.C. §103(a) as being unpatentable over Toth and Horiuchi as applied to claim 16 above, and further in view of Moore and Sembritzki (US Pub 2003/0058994). Claim 18 is rejected under 35 U.S.C. §103(a) as being unpatentable over Toth and Horiuchi as applied to claim 16 above, and further in view of Hsieh. Claims 19 and 20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Toth and Horiuchi as applied to claim 16 above, and further in view of Zhou et al. (US Pub 2002/0094064) and Grass et al. (USP 4,578,806). Claim 21 is rejected under 35 U.S.C. §103(a) as being unpatentable over Toth, Horiuchi, Zhou et al., and Grass et al., as applied to claim 19 above, and further in view of Kendrick et al. (US Pub 2003/0206614). Claim 23 is rejected under 35 U.S.C. §103(a) as being unpatentable over Toth and Horiuchi as applied to claim 16 above, and further in view of Moore. Claims 24 and 26-28 are rejected under 35 U.S.C. §103(a) as being unpatentable over Moore in view of Horiuchi. Claim 25 is rejected under 35 U.S.C. §103(a) as being unpatentable over Moore and Horiuchi as applied to claim 24 above, and further in view of Mattson (USP 5,228,070). Claims 29 and 30 are rejected under 35 U.S.C. §103(a) as being unpatentable over Moore and Horiuchi as applied to claim 28 above, and further in view of Edholm (USP 3,755,672).

Claims 16, 23, and 30 are objected to because of informalities. The Examiner also objected to the drawings.

The Specification has been amended to correct typographical errors identified by the Examiner. Claims 16, 23, and 30 have been amended to address the informalities identified by

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the Examiner. Additionally, please find replacements sheets of drawings enclosed herewith addressing the objections to the drawings raised by the Examiner.

Claim 1 has been amended to further define the present invention over the art of record. Claim 1, as originally, presented was rejected under 35 U.S.C. §102(b) as being anticipated by Moore. In contrast to that which is being claimed, Moore fails to teach or suggest a method of diagnostic imaging whereby a region of maximum attenuation of a subject is determined from the comparison of a position of the subject in a scanning bay with a reference position, and the subsequent automatic adjustment of an attenuation filter based on the determined region of maximum attenuation. Moore teaches an edge detection technique inherent with the drawbacks set forth in the Background of the Invention section of the present application.

Specifically, Moore teaches a strip of parallel light on one side of a subject and an array of light detectors on opposite side of the subject. The strip of light emits light toward the subject and light detectors and "the outputs of detectors 33 indicate the extent of the shadow cast, in the parallel light 32, by body 3." Col. 6, ll. 33-35. As such, "motors 30 are then servoed to the detector outputs, so driving wedges 26 together or apart until they present a combined attenuation to the radiation which has been predetermined to be suitable for a body 3 of that size." Col. 6, ll. 35-39. Thus, Moore teaches a system whereby the shadow cast by a body is used to ascertain an appropriate filter configuration. As readily shown in Figs. 2-5 of the reference, Moore discloses that the edges of the body define the shadow. That is, any differentials in thickness of the body have no impact on the size or shape of the shadow cast. Thus, it would appear that for the system of Moore there is assumption that the body is symmetrical. However, as set forth in the present application, the subject population is not symmetrical and, as a result, edge detection techniques have been shown to be inadequate.

In contrast, the claimed invention is directed to determining a region of maximum attenuation of a subject and making any adjustments necessary to an attenuation filter based, not on the detected edges of the subject, but on the location of maximum attenuation. In this regard, the attenuation filter can be adjusted such that uniform attenuation on the detector array is uniform and/or detectors do not saturate. Accordingly, claim 1 is believed to be directed to subject matter neither taught nor suggested by the art of record. Allowance of claims 1-15 is requested.

Regarding the rejection of claims 2, 3, 10, 11, 13, and 14, Applicant respectfully disagrees with the Examiner with respect to the art as applied, but in light of claims 2, 3, 10, 11, 13, and 14 depending from what are believed otherwise allowable claims, Applicant does not

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believe additional remarks are necessary and requests allowance of claims 2, 3, 10, 11, 13, and 14 based on the chain of dependency.

Claim 16 has likewise been amended to clarify that the value of mis-centering is determined from the position of maximum attenuation of a subject to be scanned relative to an isocenter of an x-ray beam. Claim 16, as originally presented, was rejected as being unpatentable over the combination of Toth and Horiuchi. Like Moore addressed above, Toth teaches an edge detection technique for establishing adjustments to an attenuation filter.

Toth discloses a system for estimating the physical center of a patient based on two orthogonal projections. Specifically, Toth discloses the acquisition of scout data that "is comprised of two orthogonal views from each slice position in the prescribed scan, one at a gantry angle of 0° and the other at an angle of 90°." Col. 3, ll. 33-38. After the scout data is corrected for offsets and normalized to a reference detector, the scout data is filtered to "mask[ing] out attenuation due to undesired objects such as patient table, followed by low pass filtering the scout data using an 11 point box car filter." Col. 3, ll. 43-45. Thereafter, "the edges of the patient are then located in each scout projection." Col. 3, ll. 46-47. In this regard, "[t]he attenuation data for each detector element (i) in the projection is compared to a threshold (thresh=1.5) and the lowest detector [low₀ and low₉₀] and the highest detector [high₀ and high₉₀] located at the ends of the longest contiguous string of readings above the threshold are selected as shown in FIG. 4." Col. 3, ll. 46-53. The low and high readings for both the 0° and 90° gantry angles are summed and then divided by two to give the "center 115 of the patient 15" location. Col. 3, l. 54. As such, Toth teaches determining patient edges at two orthogonal views, summing the attenuation at the patient edges for both views, and then concluding that the physical center of the patient in the two orthogonal directions is located at the mean attenuation values, respectively.

The edge detection technique disclosed by Toth has drawbacks akin to the techniques identified in the present application that the claimed invention overcomes. That is, "edge detection methods rely on identifying the center of the patient indirectly by detecting the edges of the patient, which can be particularly susceptible to error" and lead to a loss in SNR as a result of patient mis-centering. Application, pp. 5-6.

In sum, Toth teaches a technique for identifying the physical center of a patient in two orthogonal directions based on the edges of patient; such a technique is not equivalent to determining the position of maximum attenuation of a subject. Toth discloses a technique whereby the physical center of a patient is indirectly measured from the measured edges of the patient. As set forth in the present application, such an edge detection system fails to properly

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consider irregular subject shapes and sizes when finding "patient center". In other words, the physical center relative to edges of a patient may not represent the position of maximum attenuation. That is a shortcoming of the technique disclosed by Toth that is overcome by the invention of claim 16. Therefore, notwithstanding the teachings of Horiuchi (which the Examiner solely relied upon for its teaching of a computer readable storage medium for an imaging apparatus), it is believed that claims 16-23 are in condition for allowance.

Regarding the rejection of claims 17-21, and 23, Applicant respectfully disagrees with the Examiner with respect to the art as applied, but in light of claims 17-21, and 23 depending from what are believed otherwise allowable claims, Applicant does not believe additional remarks are necessary and requests allowance of claims 17-21, and 23 based on the chain of dependency.)

Claim 24 was also amended to clarify that the computer is programmed to determine a region of maximum attenuation of a subject and adjust at least one of an attenuation characteristic of an attenuation filter and a table position such that a region of minimum attenuation of the attenuation filter is aligned with the region of maximum attenuation of the subject. Claim 24, as originally presented, was rejected as being unpatentable over the combination of Moore and Horiuchi. As set forth herein, Moore discloses an edge detection technique that is fraught with drawbacks; namely, that such a technique assumes that the region of maximum attenuation of a subject to be imaged lies centered between the detected edges of the subject. As well-known in the art and reiterated in the present application, such an edge detection technique fails to adequately consider the anomalies and variations present in the subject population.

As stated previously, Moore determines the position of a subject to be imaged based on the shadow cast by that subject when parallel light is emitted toward the subject. As also stated previously, such a technique does not provide information as to the thickness of the subject to be imaged. As it is well-known that thicker subject cross-sections provide greater attenuation than thinner cross-sections, there is no means in the technique of Moore to ascertain where those thicker and thinner cross-sections are. They can only be assumed. Given with the technique of Moore that it is not possible to ascertain the position of thicker subject cross-sections, it is also not possible with that technique to adjust the configuration of an attenuation filter or reposition the subject such that a region of minimum attenuation of the attenuation filter is aligned with the region of maximum attenuation of the subject, as presently claimed. Thus, claims 24-30 are believed to be in condition for allowance.

Regarding the rejection of claims 25, 29, and 30, Applicant respectfully disagrees with the Examiner with respect to the art as applied, but in light of claims 25, 29, and 30 depending

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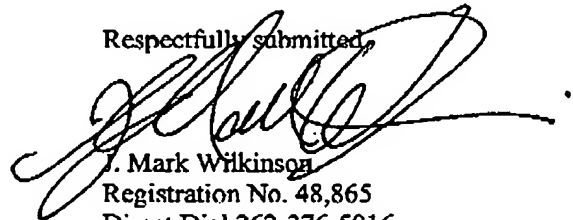
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from what are believed otherwise allowable claims, Applicant does not believe additional remarks are necessary and requests allowance of claims 25, 29, and 30 based on the chain of dependency.

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1-30.

Applicant appreciates the Examiner's consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,



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